GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT INITIATION

Date: June 19, 1972

Project Title: Combined Cotton Opener Blender

Project No.: A-1432

Project Director: Mr. J. M. Akridge

Sponsor: Cotton, Incorporated

Effective: May 1, 1972 Estimated to run until: October 31, 1972

Type Agreement: Contract No. 71-600 Amount: $ 21,900.00

REPORTS REQUIRED: Monthly Progress Reports; Quarterly Tech. Reports; Final Technical Report

SPONSOR CONTACT PERSONS: Technical Matters
Mr. R. B. Cleaver
Mgr. = Textiles Products Research
Cotton, Incorporated
P. O. Box 18039
3901 Barrett Drive
Raleigh, N.C. 27609
Phone: (919) 782-6330

Contractual Matters
(Thru GTRI)
Mr. Arthur B. Bond
Administrative Assistant
Same address as above

Assigned to: SENSOR SYSTEMS Division

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RA-62(12-66)

GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT TERMINATION

Date ~~March 14, 1973~~

PROJECT TITLE: Combined Cotton Opener Blender

PROJECT NO: A-1432

PROJECT DIRECTOR: Mr. J. M. Akridge

SPONSOR: Cotton, Incorporated

TERMINATION EFFECTIVE: ~~2/23/73 (Final Report submitted)~~

CHARGES SHOULD CLEAR ACCOUNTING BY: ~~All allowable~~ charges have been billed.

Contract Closeout Items Remaining: None

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GEORGIA INSTITUTE OF TECHNOLOGY
ENGINEERING EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

14 August 1972

Cotton Incorporated
P.O. Box 18039
Raleigh, North Carolina 27609

Attention: Mr. R. B. Cleaver
Manager, Textile Products Research

Subject: Progress Report Number 2 on Improved Cotton Opener-Blender
(Cotton Incorporated Project No. 71-600)

Work on the design and fabrication of the improved opener-blender is progressing on schedule. Most of the design has been completed and a significant percentage of the fabrication is underway.

It was decided to have the rotor blades investment cast from high strength steel rather than fabricate from rods as previously planned. Casting was chosen because a particularly attractive and strong blade design can be utilized. The investment casting process makes possible very high strength parts with very close "as cast" tolerances. The mold for the wax patterns has been fabricated and delivered to Southern Tool in Anniston, Alabama. The preliminary wax pattern looks very good. The first steel rotor should arrive this week for approval. The best delivery of the completed rotors after the approval of the prototype is three weeks which is longer than we would like. This delivery schedule will put the project slightly behind schedule, but by working around this component the loss time should be regained quickly after receiving the parts.

Several condenser designs were studied before it was decided to use a passive condensing system which is considerably less complicated and with proper design far more reliable. Work on the design of the passive or non-moving condenser should be completed by 23 August.

James M. Akridge

Senior Research Engineer
Project Director

ENGINEERING
GEORGIA INSTITUTE OF TECHNOLOGY
EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

12 October 1972

Cotton Incorporated
P. O. Box 18039
Raleigh, North Carolina 27609

Attention: Mr. R. B. Cleaver
Manager, Textile Products Research

Subject: Progress Report Number 3 on Improved Cotton Opener-Blender
(Cotton Incorporated Project No. 71-600)

Dear Sir:

Late delivery of the cast rotor blades by Southern Tool has caused a slight delay in the project, but this delay is not considered sufficient to seriously affect the project schedule.

The cast rotors appear excellent. Work has been started on finish-machining the rotors and keying them to their respective shafts. The keys have been staged so that the teeth can be arranged in a spiraled pattern. Flexibility in this pattern will permit several variations of the spiral if needed.

The Scientific-Atlanta metal cabinet used with the first U. T. opener has been modified to take the components for the new opener-blender. All components, with the possible exception of a guard hood, will be inside the cabinet. This results in a very compact device with very little wasted space.

It is expected that the final assembly will be completed during the next report period. As is usual with experimental devices of this nature, a considerable amount of adjustment is anticipated to optimize the performance. Although it is expected that the device will be in operation by the middle of October, an additional month of adjustments and minor redesign should greatly improve its performance.

Very truly yours,

J. M. Akridge
Project Director

JMK:jnh

GEORGIA INSTITUTE OF TECHNOLOGY
EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

28 November 1972

Cotton Incorporated
P.O. Box 18039
Raleigh, North Carolina 27609

Attention: Mr. R. B. Cleaver
Manager, Textile Product Research

Subject: Progress Report Number 4 on Improved Cotton Open-Blender (Cotton Incorporated Project No. 71-600) (Georgia Tech Project No. A-1432)

Dear Mr. Cleaver:

The new opener blender has been assembled and performance tests begun. Initial performance has been encouraging. The speed ratios between the four opening rotors are being adjusted to several different combinations to determine whether improved performance can be obtained.

Forty samples from each of the three bales used in our previous tests were obtained from the Textile Engineering Department. Half of these samples were run through the new machine and half were kept in the "as received" condition. The blended and "as received" samples have been delivered to the Fiber Lab at the Textile Engineering Department for fiber evaluation.

The machine was disassembled after running the sixty samples. The original purpose of the disassembly was to add rake to the rotor blades to lessen a tendency to jam when fed cotton too fast. It was discovered that one of the feed rolls had been twisted during the test. This shaft is being strengthened to minimize damage. Several additional changes are being made to improve strength, lessen jamming, and improve opening.

We will not know until we have the results from the fiber tests whether it will be necessary to make changes to lessen fiber damage. If the Fiber Lab at Georgia Tech cannot make the fiber tests very soon, the samples will be shipped to the Textile Research Laboratory at Texas Tech.

Very truly yours,

James M. Akridge

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
Atlanta, Georgia 30332

SECOND-GENERATION COTTON OPENER-BLENDER

Final Report

on

EES Project A-1432

by

J. M. Akridge

Prepared for

Cotton, Incorporated
Raleigh, North Carolina

under
Contract 71-600

January 1973

As labor costs increase, this extensive testing, which involves a considerable amount of labor, becomes prohibitively expensive. In addition to the labor costs, tests which are subject to state of mind, fatigue, or other human-induced errors, may result in a wide variation of properties if tested by different people or by the same person on a different day. The obvious alternative to the present testing method is to automate the testing as much as possible to lower labor costs and increase accuracy.

The first step in the automation procedure is naturally one designed to minimize the number of tests required to properly identify the bale quality. This step has been the objective of this research project. If the samples removed from various places within a bale can be processed and blended such that the cotton property tests need only be conducted on one sample rather than on each of the bale samples, the number of tests required could be drastically reduced.

Under a previous contract with Cotton, Incorporated, the Engineering Experiment Station working with Georgia Tech's A. French Textile School developed a cotton opener and a lickerin-type blender. Used in series, the two machines open and blend cotton samples taken from a number of locations in a bale sufficiently well that one small sample of the blended cotton is representative of the complete bale rather than of only one small section. This equipment is presently being used at the Textile Research Center at Texas Tech University. Results indicate that this combination of machines is capable of meeting the design objectives. Although the equipment meets the original objectives of the program, it became obvious during the later stages of the previous program that a considerably smaller and more easily operated machine with increased reliability would be desirable.

A small laboratory model of an interlocking spiked-cylinder opener-blender was fabricated to evaluate the concept. Preliminary tests with this model indicated considerable potential for further development. The spiked-cylinder concept promised greater reliability, higher feed rates, smaller size, and lowered production cost while still meeting the blending objectives. The design objectives were to blend a 100-gram sample of cotton in twenty seconds without reducing the upper quartile length

5. Repeat steps 3 and 4 above until all of the cotton causing the jam has been removed.
6. Turn on Blower Switch.
7. Turn on Lickerin Switch (if lickerin rolls do not start, go back to step 5 above).
8. Turn on Feed-Roll Switch.
9. When machine has cleared, remove the cotton from the condenser.
10. Replace hood and four wing nuts.
11. Continue running samples.

To minimize trash lint dumped into the room where the blender is used, the blower has been equipped with a standard exhaust duct. This duct should be attached to an outside vent or to a filter large enough so as not to create too great a back pressure.